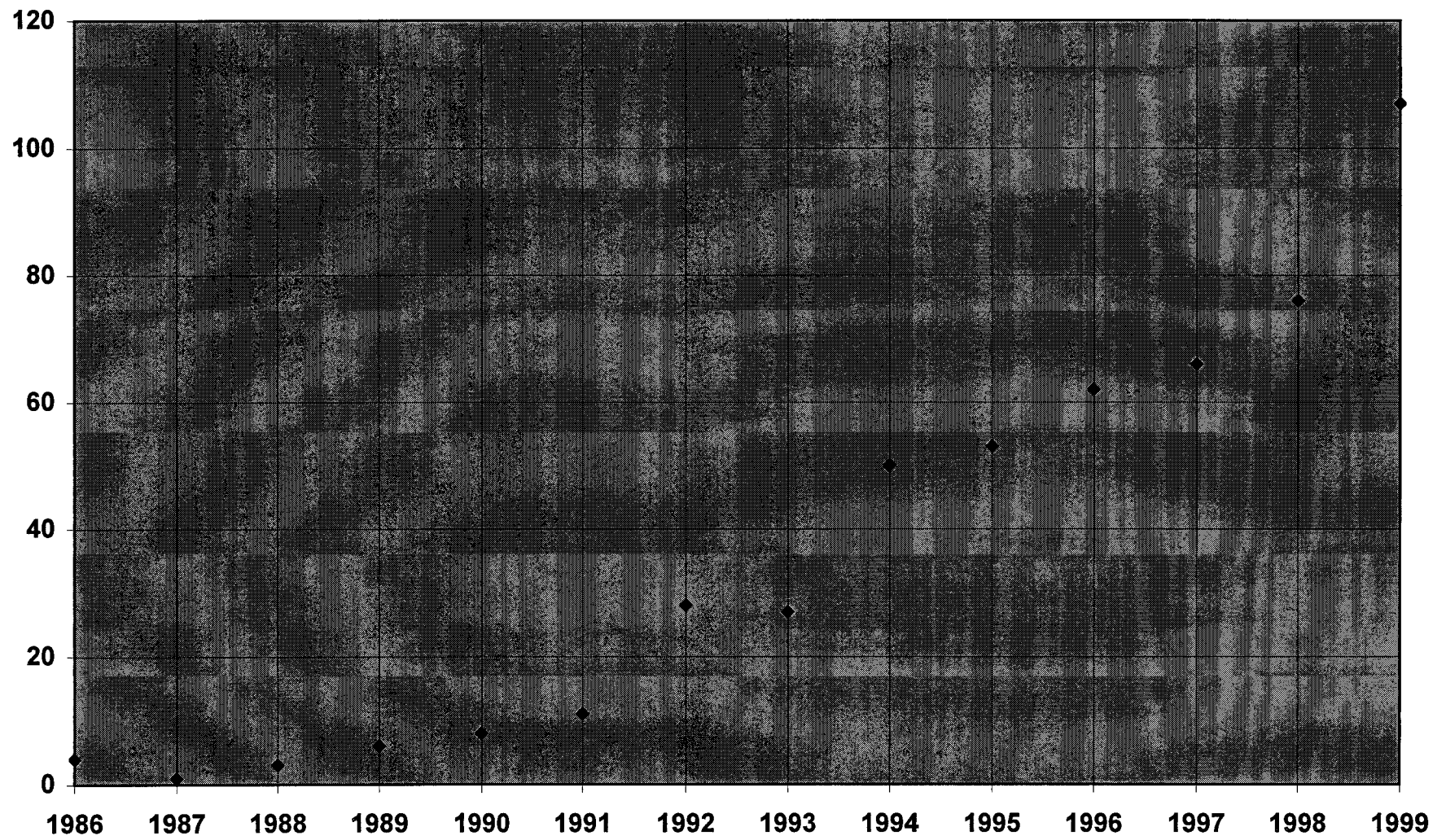


The Effect of Lossy Ultrasound Image Compression on the Precision of Carotid Wall Thickness Measurements

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Ultrasound systems with digital image output may offer important advantages for measurement of arterial intima media thickness (IMT) since the image degradation associated with video image digitizing will be avoided. However, the effect of commonly used lossy JPEG compression on IMT measurement precision is completely unknown. To determine potential precision loss, carotid artery images were acquired from 20 subjects twice and the IMT of the uncompressed images compared with that from the same images after JPEG compression from 75% to 95%. The Mean Absolute Difference in IMT between uncompressed and compressed images was 0.002 mm for 75% compression and increased with the degree of compression increased to a maximum of 0.008 mm for 95% compression. The percent change in IMT was less than 1% for images compressed up to 95 %. These results suggest that substantial image compression may have minimal negative effect on IMT measurement precision.

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Comparison of intima media thickness (mm) of compressed and uncompressed images

Images	40	40	40	40	40	40
Compression	none	75%	80%	85%	90%	95%
Image size (bytes)	245,760	61,440	49,152	36,864	24,576	12,228
Mean Absolute Difference (mm) - Uncompressed vs compressed images		0.002	0.003	0.004	0.004	0.009

Mean Absolute Difference (MAD) example:

$$J= 40$$

$$MAD_{95\%} = (1/40) \sum_{J=1} |IMT_{95\%}(j) - IMT_0(j)|$$

Percent change in IMT due to image compression.

Compression	0%	75%	80%	85%	90%	95%
% IMT change (mm) due to compression		0.249	0.312	0.410	0.466	0.996